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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,733	07/28/2003	Matthew S. Buynoski	039153-0460 (G1165)	4021
26371	7590	07/08/2004	EXAMINER	
FOLEY & LARDNER 777 EAST WISCONSIN AVENUE SUITE 3800 MILWAUKEE, WI 53202-5308			GARCIA, JOANNIE A	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 07/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/628,733	Applicant(s) BUYNOSKI ET AL.	
	Examiner Joannie A Garcia	Art Unit 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

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The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference character(s) mentioned in the description: 32, 53, 54, and 56. Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claims 1-20 are objected to because of the following informalities:

The term "slowly" in claim 1 is a relative term, which renders the claim indefinite. The term "slowly" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. If applicant intends a particular annealing, it should be clearly recited.

Claim 3 recites the limitation "barrier layer" in line 1. There is insufficient antecedent basis for this limitation in the claim.

In claim 4, line 1, "low temperature" should be preceded by --the--.

The term "large" in claim 8 is a relative term, which renders the claim indefinite. The term "large" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably

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apprised of the scope of the invention. If applicant intends particular grain sizes, it should be clearly recited.

In claim 15, line 1, "first anneal" should be preceded by --the--.

The term "large" in claim 16 is a relative term, which renders the claim indefinite. The term "large" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. If applicant intends a particular grain growth, it should be clearly recited.

The term "long" in claim 16 is a relative term, which renders the claim indefinite. The term "long" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. If applicant intends a particular period of time, it should be clearly recited.

Appropriate correction is required.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 6, 8-14, 16, and 18-20, are rejected under 35 U.S.C. 102(e) as being anticipated by Lopatin et al (U.S. Patent 6,660,633).

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Lopatin et al discloses providing a TiSiN or WN barrier layer 10 along lateral sidewalls of trench 6 (Figure 6, and Column 5, lines 7-10), providing a copper seed layer 20 in trench 6 (Figure 6, and Column 9, line 2), electroplating the copper seed layer to provide copper material 30 in the trench (Figure 6, and Column 9, lines 12-15), providing a source of at least one alloy element such as Zn (Column 9, lines 5-7), wherein the alloy element is included in the copper seed layer (Column 9, lines 28-32), first annealing the copper material to cause grain growth over a period of time (Column 9, lines 20-30), second annealing the copper material to distribute the at least one alloy element uniformly in the copper material (Column 9, lines 43-48), wherein the second annealing is performed after the first annealing at a temperature range of 150 °C to 450 °C, and for a duration range of 0.5 minutes to 60 minutes (Column 9, lines 20-48, and Column 12, lines 60-65), and providing additional alloy elements in a layer 26 above the copper material (Figure 7, and Column 9, lines 35-37). Lopatin et al discloses performing the annealing steps in a temperature range of 150 °C to 450 °C, and for a duration range of 0.5 minutes to 60 minutes (Column 12, lines 60-65), therefore, performing the second anneal at a higher temperature than the first anneal, and for a shorter period of time, would have been achieved.

Claims 4, 5, 7, 15, and 17, are rejected under 35 U.S.C. 103(a) as being unpatentable over Lopatin et al as applied to claims 1-3, 6, 8-14, 16, and 18-20 above, and further in view of the following comments.

With respect to claims 4, 5, 7, 15 and 17, it would have been a matter of routine optimization within the teachings of Lopatin et al to determine a suitable time and temperature to achieve first annealing formation step.

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Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-0956 until 2/4/04. See MPEP 203.08.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Joannie Adelle García whose telephone number is (571) 272-1861. The examiner can normally be reached on Monday through Friday.

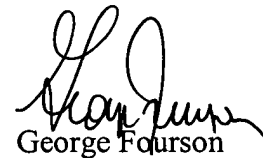
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571) 272-1855. The fax number for this group is 703-872-9306 for before final submissions, 703-872-9306 for after final submissions and the customer service number for group 2800 is (703) 872-9317. Updates can be found at <http://www.uspto.gov/web/info/2800.htm>.



JAG

July 1, 2004

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